SOPS/79/32

SUMMARY OF PRELIMINARY RESULTS OF A DOLPHIN TAGGING FEASIBILITY STUDY

by

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A tagging feasibility study was initiated in the area around Clipperton Island in September-October 1978. This area was chosen to increase the probability of tag recoveries since it is an area of traditionally intensive fishing, particularly in the early part of the year. It was anticipated that NMFS and IATTC technicians ("observers") aboard commercial seiners would be making most of the tag recoveries and that a large group of technicians would be going to sea 2-3 months after the dolphins were tagged. This gave time for the dolphins to disperse and time for the tetracycline, injected into some of the animals (to mark the bones and teeth for age determination studies) to be deposited in hard tissues of the animals.

With the dramatic reduction of dolphin mortalities in the fishery from 1973 to 1978, the likelihood of physically recovering a tagged animals has decreased. Therefore, a highly visible dorsal-fin disc tag 2 1/2" in. diameter was developed (Figure 1). International orange and yellow were chosen as the most visible colors at sea. The tag is slightly domed to reduce hydrodynamic drag and is attached with

stainless steel bolts covered by biocompatible virgin teflon sheaths to assure tag retention. All tags were sequentially numbered but, due to manufacturing problems, the numbers were barely visible. Also, due to manufacturing problems only 3 groups of tags bearing distinct geometric designs rather than the 12 designs originally planned were available. These large designs were to allow for visual recognition of tag groups when the numbers could not be read

A porpoise school impoundment system, the PSIS (Figure 2), was developed to allow safe holding and processing of large numbers of dolphins caught in the tuna seine (Powers, Butler, Jennings, McLain, Peters, and DeBeer, 1979).

Six hundred fifty-six dolphins, mostly spotted dolphins, Stenella attenuata, were tagged during nine net sets between September 29 and October 24, 1978. Of these, 331 received tetracycline injections and were tagged with special orange "T" tags. All 656 animals plus 10 neonates had their dorsal fins notched according to a predetermined code which changed with each set. The notches were to serve as permanent marks in the event of tag shedding. Table 1 summarizes the results of the tagging operations. (Futher details on the cruise, including the radio tracking study on short-term school integrity are contained in the cruise report (Powers et al., 1979.))

As of August 24, 1979, approximately 11 months later, 68 resights of tags and 27 of notched fins have been reported. Figure 3 shows the tag release sites and the number of tags and notches resighted by 1^{o} squares. Of the 68 tag resights, 14 were positively identified to number. All resights, except 4, have been reported from vessels with

LITERATURE CITED

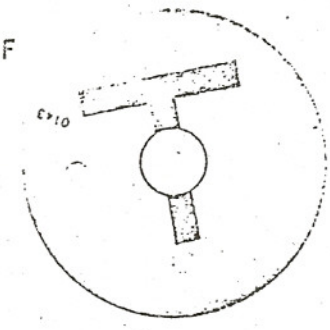
Powers, J.E., R. W. Butler, J. G. Jennings, R. McLain, C. B. Peters, and J. DeBeer. 1979. Summary of Research Results from the Fourth Cruise of the Dedicated Vessel, 12 September to 31 October 1978. Southwest Fisheries Center Admin. Rep. No. LJ-79-14

Perrin, W.F., W.E. Evans, and D.B. Holts. 1979. Movements of Pelagic Dolphins (Stenella spp.) in the Eastern Tropical Pacific as indicated by Results of Tagging, with Summary of Tagging Operations, 1969-1976. NOAA Tech. Rep. NMFS SSRF (in press)

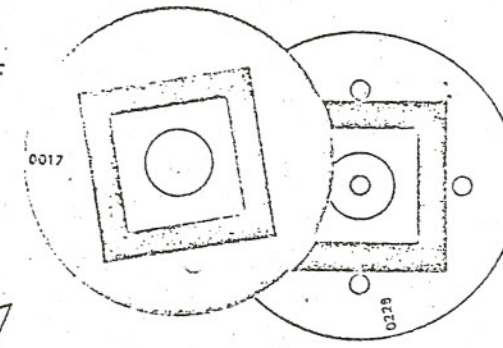
FIGURE 1

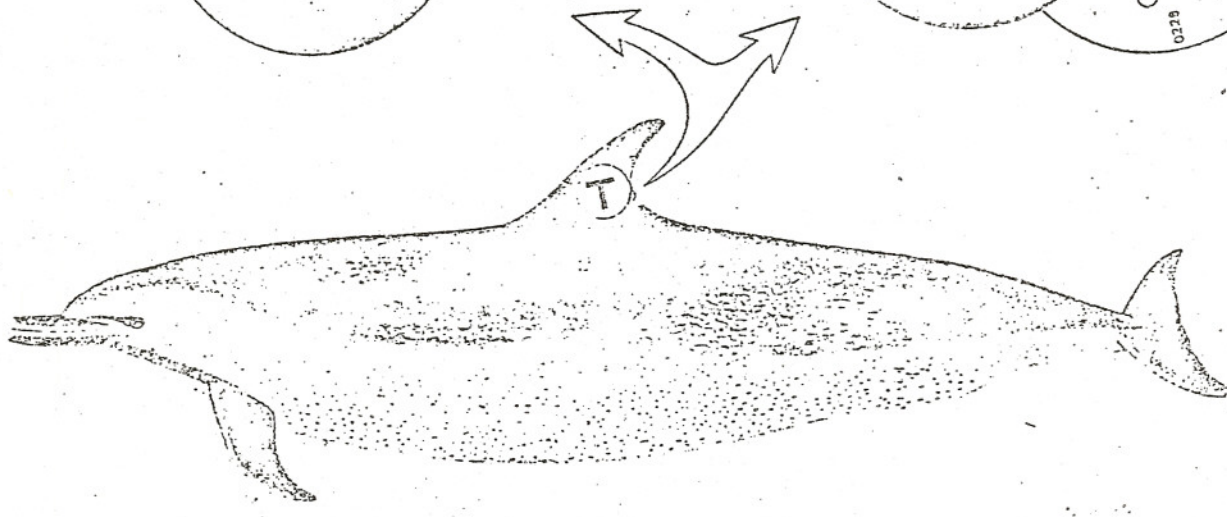
FOR RETURN OF PORPOISE TAGS

$100 FOR RETURN OF PORPOISE WITH TAG



$5 FOR RETURN OF FIN WITH TAG





The U.S. National Marine Fisheries Service conducted an experimental tagging study in the area to the east of Clipperton Island in October - November, 1978. Orange and yellow disc tags were attached to the dorsal fins of 656 porpoise. Of these, 331 were tagged with special orange "T" tags indicating tetracycline injections for an age determination study. All fins were notched to serve as permanent marks.

It is essential that the bodies of any accidentally killed porpoise involved in the age determination study, as indicated by the "T" tag, be returned so that the teeth and bones can be examined. Only the fins with the tags in place need to be returned from any dead porpoise with other types of disc tags, so the tags can be evaluated. The location and date of tag recovery must be indicated. Reports of sightings of tagged porpoise will be appreciated.

When an observer is on board, the reward will go to the vessel.

TO COLLECT REWARD: Send fin with tag or entire porpoise if a "T" tag. Tell where and when tag was collected.

MAIL TO:
U.S. National Marine Fisheries Service
Southwest Fisheries Center
P.O. Box 271
La Jolla, California 92038
PHONE:
(714) 453-2820

WARNING: NO PORPOISE ARE TO BE INTENTIONALLY KILLED - IN ACCORDANCE WITH THE MARINE MAMMAL PROTECTION ACT OF 1972.

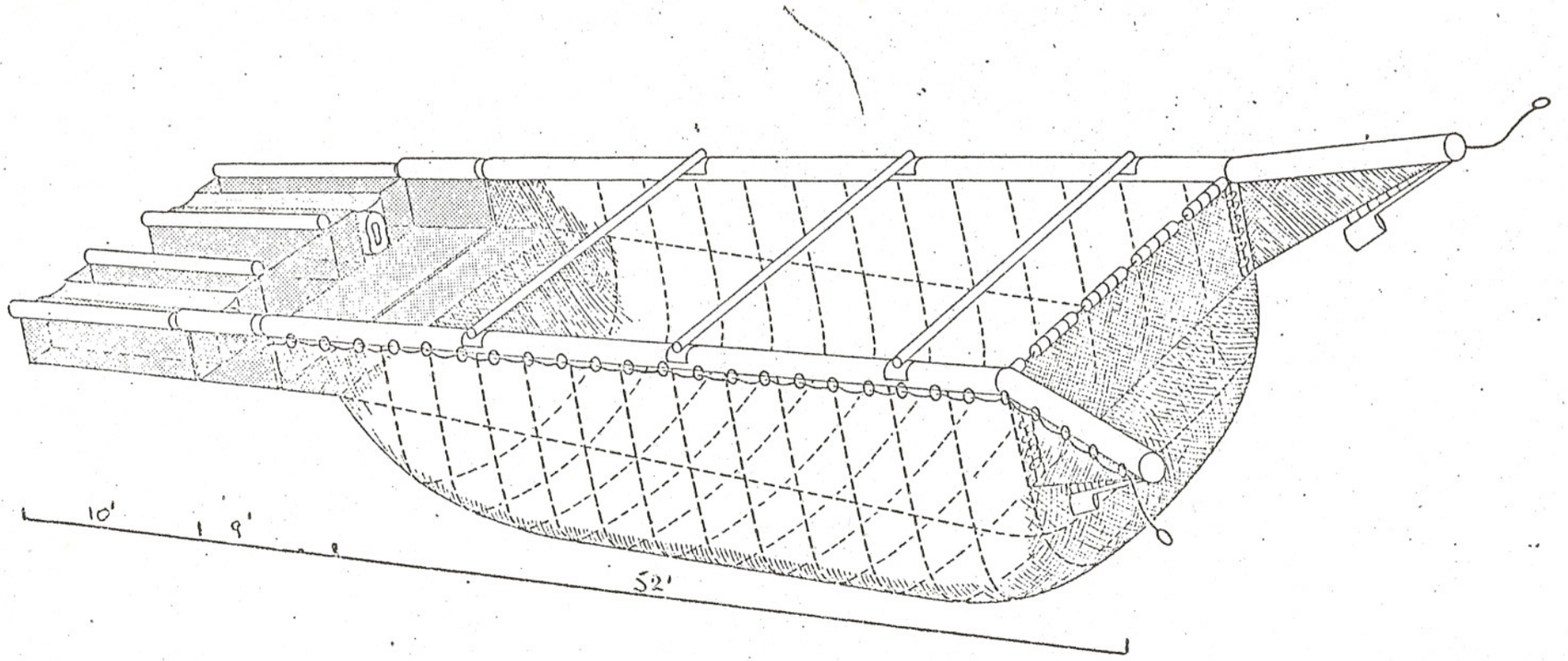


FIGURE 2. PORPOISE SCHOOL IMPOUNDMENT SYSTEM (71H)

Table 1. Summary of tagging operations Sept - Oct 1978.

Set No.	Disc[a] Type	Notch[b] Code	Spotted Dolphin Tagged and Released			Eastern Spinner	Total Number of Disc Tags Placed	Tagging Operations	Average Minutes Per Tag Per Chute
			No. of Disc Tags	No. of Notched Only	No. of Radio Tags	No. of Disc Tags			
2	OT	DNB	44	0	0	0	44	Disc Plus Tetracycline	4.4
4	YS	SNT	52	7	2	0	52	Disc Plus 1 Radio Tag	3.3[c]
7	OS	SNM	128	2	1	3	131	Disc Plus 1 Radio Tag	3.6[c]
8	OT	DNB	131	0	0	0	131	Disc Plus Tetracycline	3.3
11	OS	SNB	101	0	2	0	101	Disc Plus 2 Radio Tags	3.2[d]
12	YS	DNM	29	1	1	12	41	Disc Plus 1 Radio Tag	3.8[c]
13	OT	DNB	50	0	0	0	50	Disc Plus Tetracycline	3.4
15	OT	DNB	64	0	0	0	64	Disc Plus Tetracycline[e]	3.7
16	OT	DNB	42	0	0	0	42	Disc Plus Tetracycline[e]	3.0
TOTAL			641	10	6	15	656		

[a]Disc tag types were: Orange T (OT), Orange Square (OS), and Yellow Square (YS).

[b]Notch codes were: double notch at the base of the dorsal fin (DNB), single notch at the tip of dorsal fin (SNT), single notch base (SNB), single notch mid dorsal (SNM), and double notch mid dorsal (DNM).

[c]Includes time needed to place one radio tag on a spotted porpoise (less than five minutes).

[d]Includes time needed to place a radio tag on each of two spotted porpoise (less than 10 total minutes).

[e]Blood sampling also occurred, however, it is not included in times.

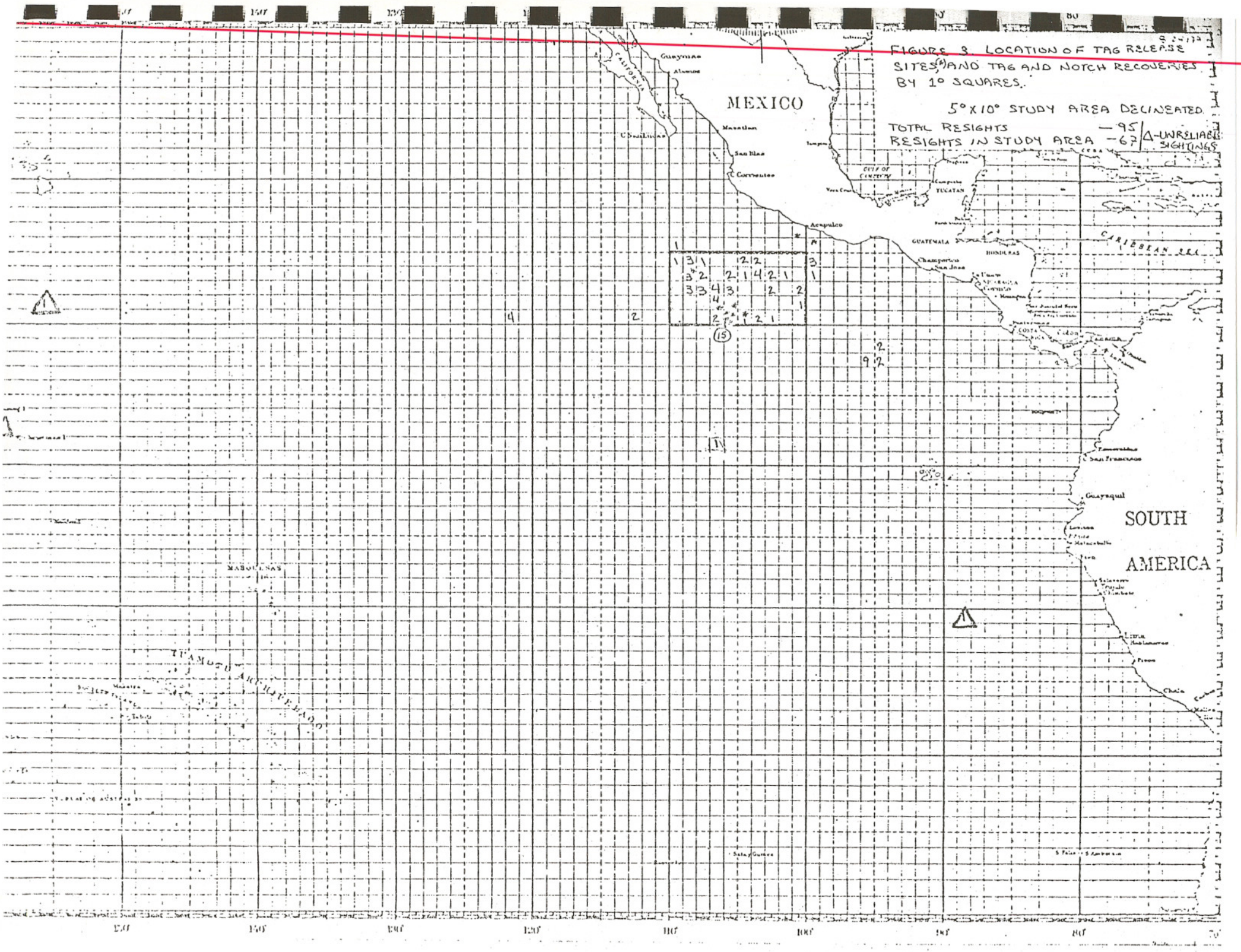


FIGURE 3 LOCATION OF TAG RELEASE SITES (#) AND TAG AND NOTCH RECOVERIES BY 1° SQUARES.

5° X 10° STUDY AREA DELINEATED.

TOTAL RESIGHTS — 95
RESIGHTS IN STUDY AREA — 67 | Δ-UNRELIABLE SIGHTINGS

NMFS technicians. Two tagged dolphins were reported by a yachtsman around Christmas Island (160°W) and are believed to be unreliable. One tagged dolphin, at about 88°W and 11°S, was reported by a crewmember but was not observed by the NMFS technician. Posters (Figure 1) were distributed to every U.S. tuna vessel but no tags have been returned unless a NMFS observer was onboard. NMFS observers have been placed on approximately 1/3 of the trips made by U.S. vessels. All recoveries except one from tuna vessels were made during dolphin sets.

For purposes of analysis, a study area of 5° x 10° has been designated between 10°N - 15°N and 100°W - 110°W. Of the 95 resights, 67 (71%) were made within this area. In order to interpret the high tag and notch resight rate of 14% (number of resights = 14% of tags released) the fishing effort of vessels carrying technicians (NMFS and IATTC) for the same time period was analyzed using the data in the SWFC's computer data base as of August 9 and adding by hand data from the last cruise on which notches were sighted which had not been added to the computer data base. These data were compiled by 1° square and by month. The data were compiled for all sets, for all dolphin sets and for all sets during curises on which there were resights. Basically, this was done to determine whether the high recovery rate was due to disproportionate fishing effort in the study area and whether the cruises with resights were acting normally.

A total of 3,706 sets were reported for the period September 29, 1978 to August 8, 1979 of which 382 (10%) were made in the study area (Figure 4). Of the total number of sets, 1588 (43%) were dolphin sets. Of these sets, 337 (21%) were made in the study area (Figure 5). Figure

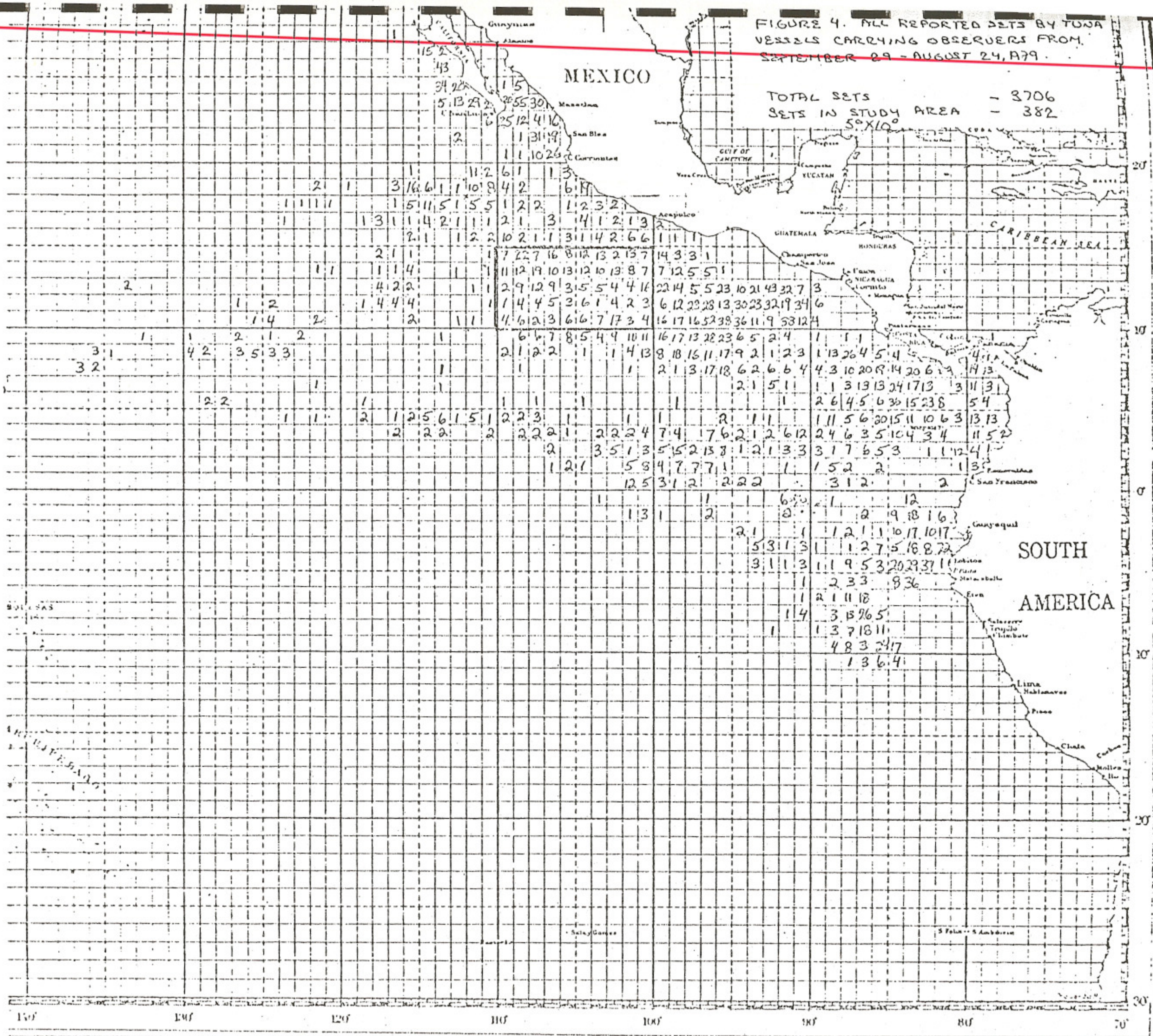


FIGURE 4. ALL REPORTED SETS BY TUNA VESSELS CARRYING OBSERVERS FROM SEPTEMBER 29 - AUGUST 24, A79.

TOTAL SETS - 3706
SETS IN STUDY AREA - 382
5°X10°

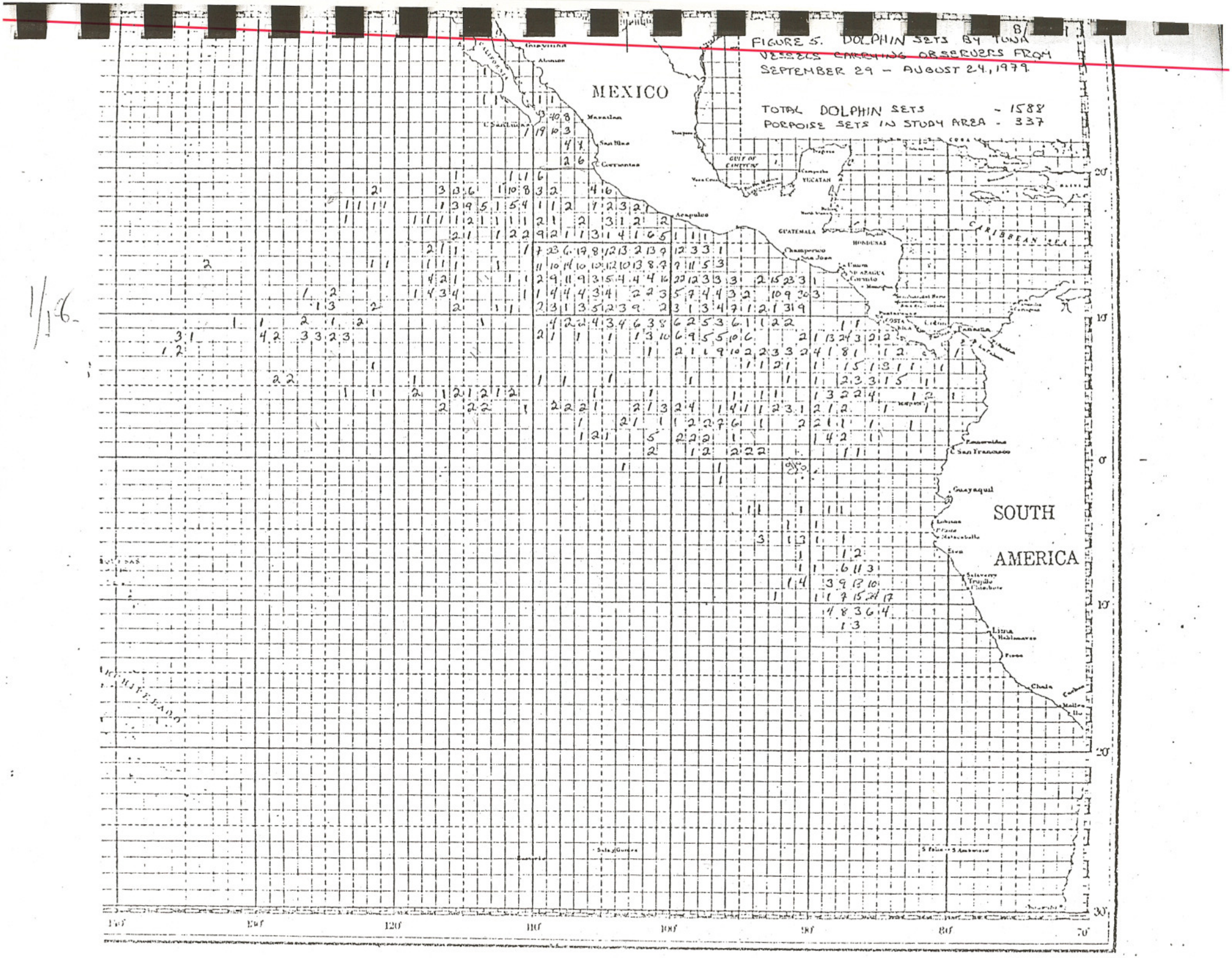


FIGURE 5. DOLPHIN SETS BY TUNA VESSELS CARRYING OBSERVERS FROM SEPTEMBER 29 – AUGUST 24, 1979

TOTAL DOLPHIN SETS - 1588
PORPOISE SETS IN STUDY AREA - 337

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6 shows the total number of dolphin sets for other 5^{o} x 10^{o} areas in comparison with the study area. Considering the size of the area covered by the fishery, this indicates relatively heavy fishing in the study area.

Preliminary comparison of the location of sets by vessels which made the resights with the location of the overall fishing effort indicates that they generally were fishing areas covered by the other vessels; they had no apparent greater probability of sighting tagged dolphins. Therefore, the data should generally indicate the distribution of the tagged dolphins over the areas being fished.

An analysis of fishing effort and recoveries by month for the whole area and the study area is summarized in Figure 7. (Data for fishing effort for June and July are incomplete, since not all the data are available.) The data indicates that a large number of sets by vessels carrying technicians was made in January-March, with the greatest number in March. The greatest number of sets in the study area, 104 sets, was made in January with fishing shifting to the east in February and March. Most of the sets in the latter two months were not made on dolphins, however. Most resights were made when the dolphins were in the net. The fishing effort in the study area reflects fluctuations in dolphin fishing, rather than overall fishing effort. With the exception of the rush to the area when the season opens, the effort was rather uniform throughout the period.

The two large peaks in tag resights occurred in October and March. All but one of the tags resighted in October were recovered by the tagging vessel, 8 during the radio tracking experiments during which the

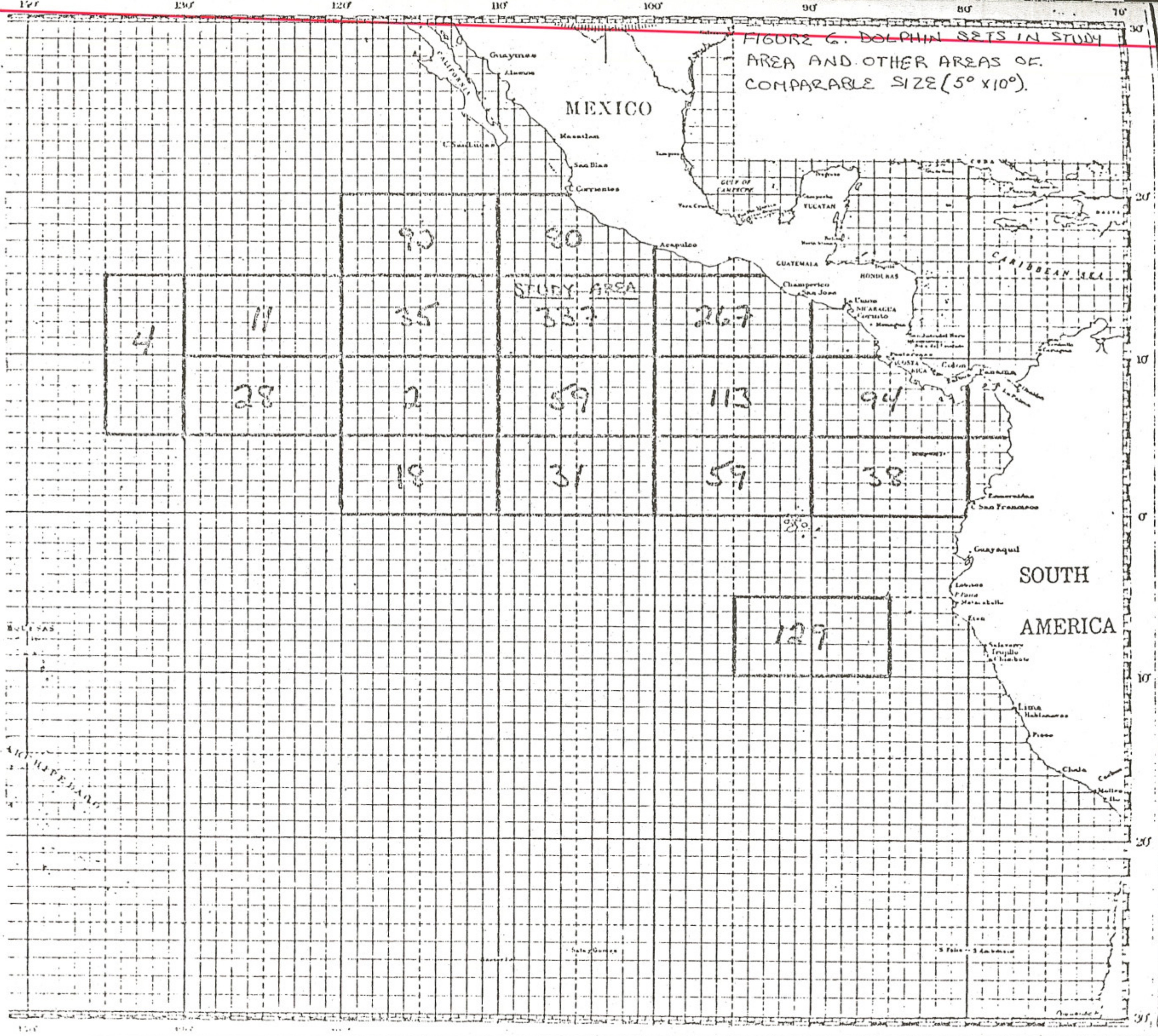

FIGURE 6. DOLPHIN SETS IN STUDY AREA AND OTHER AREAS OF COMPARABLE SIZE (5° x 10°).

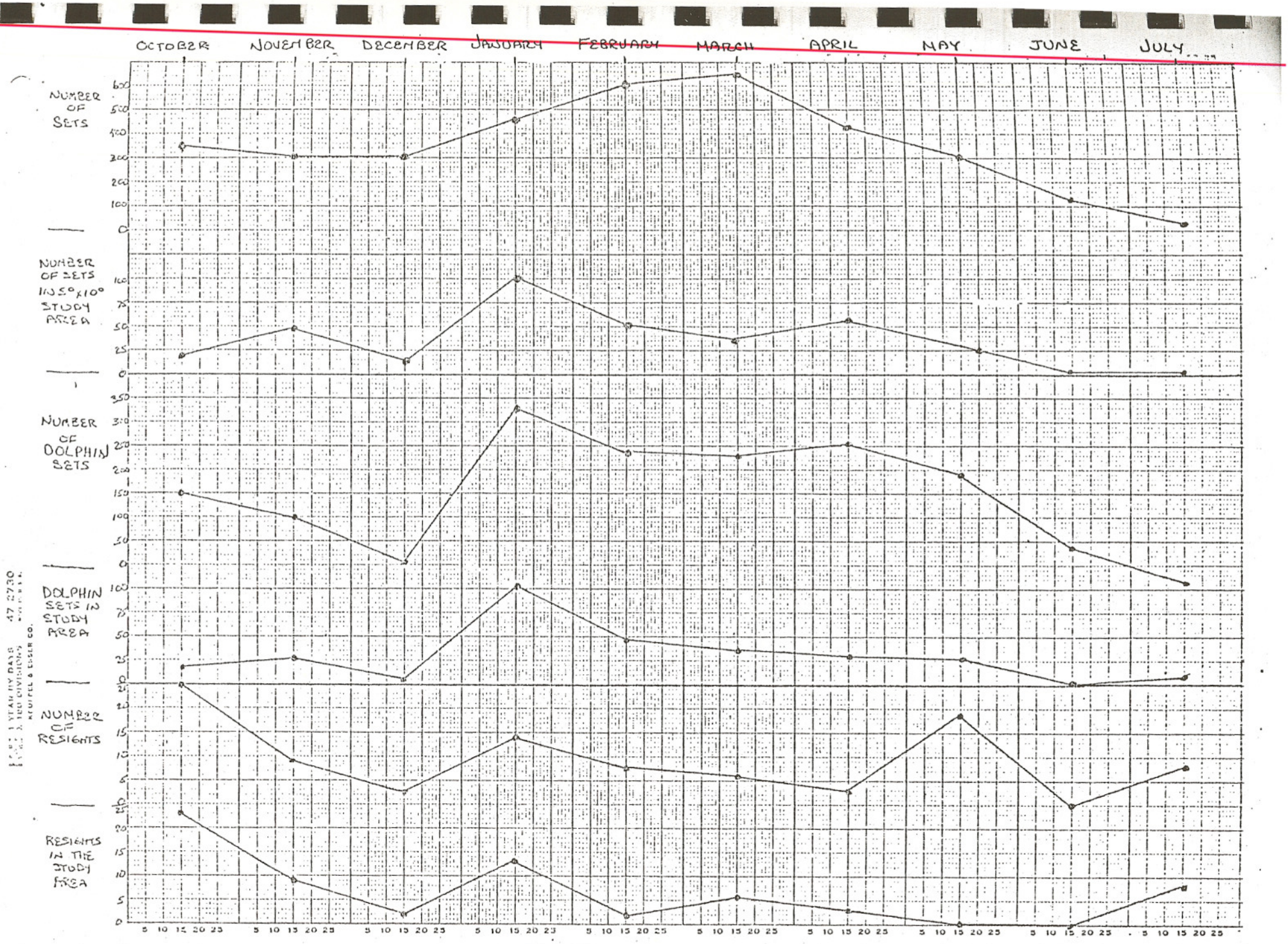

FIGURE 7. MONTHLY COMPILATIONS OF DATA ON ALL SETS, DOLPHIN SETS, AND RESIGHTS FOR THE WHOLE AREA AND THE STUDY AREA.

radio tagged animal was being followed, presumably with the tagged school. The second peak in May is from one cruise in which the technician sighted 19 fin- notched animals outside the area in May and another 8 in July inside the area.

No report of a definite resighting of a tag has been reported since April 14. One possible explanation of this is tag shedding. The fishing effort in May was widely spread, however, and the data for June and July are scanty, with minimal coverage in and around the study area. Therefore, no conclusion can be made as to whether or not tag shedding is responsible for the recent lack of tag resights.

Tables 2a and 2b indicate the minimum and maximum distances traveled and days at liberty of resighted dolphins. In most cases the tags were not individually identifiable; therefore, the calculations are based on the nearest and most distant release sites and on the earliest and latest release dates (not necessarily of corresponding sets). The maximum distances reported (#66 and #67) were about 3278 and 3560 nautical miles. The respective maximum days at liberty are 18 and 26. These sightings were reported by a yachtsman and are considered unreliable. The IATTC learned of the sightings and the yachtsman was contacted and sent a poster. The yachtsman responded indicating that on two occasions orange tagged dolphins were sighted. The sightings were unlikely since they would mean that the animals traveled 137-182 nm per day.

The next largest distance (#48) of 1622-1877 nm was a sighting reported to an observer by a crew member in the backdown channel but the tagged dolphin was not seen by the observer. It would have been at

337 15

337 schools caught

46 schools [illegible]

15 schools tagged

3X

TABLE 2a. MAXIMUM AND MINIMUM DISTANCE TRAVELED AND DAYS AT LIBERTY OF RESIGHTED TAGGED DOLPHINS

RESIGHT NUMBER	TAG TYPE	DISTANCE		DAYS @LIBERTY	
		MIN	MAX	MIN	MAX
1	10	39.36	-	1	-
2	10	39.36	-	1	-
3	01	17.99	-	3	-
4	02	52.26	-	2	-
5	02	96.32	99.10	4	-
6	03	60.90	-	2	-
7	03	60.90	-	2	-
8	12	60.90	426.00	2	12
9	03	60.90	-	2	-
10	03	60.90	-	2	-
11	12	60.90	426.00	2	12
12	10	12.77	453.99	0	16
13	10	12.77	453.99	0	16
14	10	12.77	453.99	0	16
15	11	12.36	-	4	-
16	11	12.36	-	4	-
17	11	23.82	-	8	-
18	12	48.14	-	2	-
19	12	48.14	-	2	-
20	01	44.51	-	8	-
21	01	44.51	-	8	-
22	02	69.69	-	16	-

TABLE 2a. Cont

RESIGHT NUMBER	TAG TYPE	DISTANCE MIN	DISTANCE MAX	DAYS @LIBERTY MIN	DAYS @LIBERTY MAX
23	02	58.90	-	12	-
24	10	117.97	390.19	17	42
25	10	67.14	497.91	30	55
26	10	87.14	512.88	30	55
27	11	160.13	169.44	44	48
28	01	169.23	-	48	-
29	10	92.82	462.93	32	57
30	10	92.82	462.93	32	57
31	10	64.71	462.20	32	57
32	02	184.14	-	49	-
33	11	199.12	230.54	51	55
34	13	57.40	553.50	41	66
35	10	521.87	939.66	42	67
36	10	202.57	307.38	79	104
37	10	20.92	533.93	90	115
38	13	180.06	388.07	99	124
39	10	24.29	542.26	84	114
40	10	223.84	335.62	95	120
41	10	82.57	497.39	118	143
42	10	82.57	497.39	118	143
43	10	123.10	501.21	124	149
44	13	69.67	533.46	117	142

TABLE 2a. CON'T

RESIGHT NUMBER	TAG TYPE	DISTANCE MIN	DISTANCE MAX	DAYS @LIBERTY MIN	DAYS @LIBERTY MAX
45	13	243.86	299.41	126	151
46	14	31.47	549.65	125	150
47	14	146.16	602.04	125	150
48	13	1622.26	1876.88	127	152
49	10	241.84	445.64	103	128
50	10	24.50	526.07	128	153
51	10	227.42	266.15	82	107
52	10	216.58	278.78	159	184
53	10	103.04	551.56	83	108
54	13	103.04	551.56	83	108
55	13	203.38	326.96	155	180
56	10	227.23	326.96	155	180
57	13	161.84	278.42	88	113
58	13	167.79	299.92	89	114
59	13	182.47	297.91	89	114
60	11	289.00	315.60	161	165
61	10	221.94	470.21	158	183
62	13	160.53	390.51	159	184
63	13	97.00	433.89	90	115
64	01	280.79	-	83	-
65	11	187.86	219.34	155	159
66	13	2780.88	6278.41	2	18

TABLE 2a. CON'T

RESIGHT NUMBER	TAG TYPE	DISTANCE MIN	DISTANCE MAX	DAYS @LIBERTY MIN	DAYS @LIBERTY MAX
67	13	3134.24	3559.77	1	24
68	11	120.76	153.34	185	189

TABLE 2b. MAXIMUM AND MINIMUM DISTANCE TRAVELED AND DAYS AT LIBERTY OF RESIGHTED NOTCHED DOLPHINS

RESIGHT NUMBER	NOTCH TYPE	DISTANCE		DAYS @ LIBERTY	
		MID	MAX	MID	MAX
1	25	769.97	1288.29	189	214
2	26	915.68	1228.19	202	210
3	25	769.97	1288.29	189	214
4	25	769.97	1288.29	189	214
5	24	427.75	1228.19	216	-
6	27	338.52	839.91	195	220
7	26	565.47	-	222	-
8	25	522.36	808.16	201	226
9	25	522.36	808.16	201	226
10	27	565.47	592.44	214	222
11	26	597.57	605.86	215	223
12	26	597.57	605.86	215	223
13	25	556.20	826.78	202	227
14	25	552.20	826.78	202	227
15	25	556.20	826.78	202	227
16	25	586.77	888.55	203	228
17	27	634.14	671.71	216	224
18	25	532.78	874.86	206	231
19	27	532.78	874.86	206	231
20	26	100.31	319.21	264	272
21	26	100.31	319.21	264	272
22	25	120.32	365.22	251	276

TABLE 2.b. Con't

RESIGHT NUMBER	NOTCH TYPE	DISTANCE		DAYS @LIBERTY	
		MIN	MAX	MIN	MAX
23	24	115.04	318.89	264	272
24	24	115.04	318.89	264	272
25	25	50.45	493.26	253	278
26	26	275.92	447.33	266	274
27	26	305.02	484.63	267	275

liberty from 127-152 days. Perrin (1979) found that 30 to 50 nm per day was an average for short term travel. Recoveries by the tagging vessels had one-day travel distances of 39 nautical miles but over several days the distance traveled per day decreased, indicating a milling pattern. Determination of total distance traveled per day for long-term returns is not possible. Although most of the movement was north of and localized around the release areas, there is one positive sighting (#35) at least 521 nm south of the release site 42 days after release.

In conclusion, 656 tags were released and 68 tagged dolphins and 27 fin-notched dolphins without tags were resighted/recovered over 11 months. It is not possible to estimate the number of multiple resightings. The high recovery rate is attributed to the study area being one of relatively continuous fishing effort, where the probability of recovery is higher than for other areas. The tags were designed to have a better than normal shedding rate. Most tag types tested by the SWFC had a high initial shedding rate (normally shed during the first 7 days) whereas this design was retained by some test animals about one year.

Most tag resights have been made within about 500 miles of the release sites. Notch resights (dolphins without tags) were reported latter and were at greater distances. In view of the fishing effort, movements to the east and southeast had beter probability of being detected than movements to the west and south (see Figure 6).

The animals in the study area were certainly subjected to continuous fishing pressure particularly if a large proportion of the resights were multiple resights. If many of the observed sightings were multiple resights, the population size must accordingly be smaller than

would be the case if multiple resights were few.